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[54] **RUNNING GEAR FOR A RAILBORNE VEHICLE WITH RADIAL ADJUSTABILITY**

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[30] **Foreign Application Priority Data**

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[51] **Int. Cl.**[6] **B61F 5/38**

[52] **U.S. Cl.** **105/168**

[58] **Field of Search** 105/165, 167, 168, 218.2

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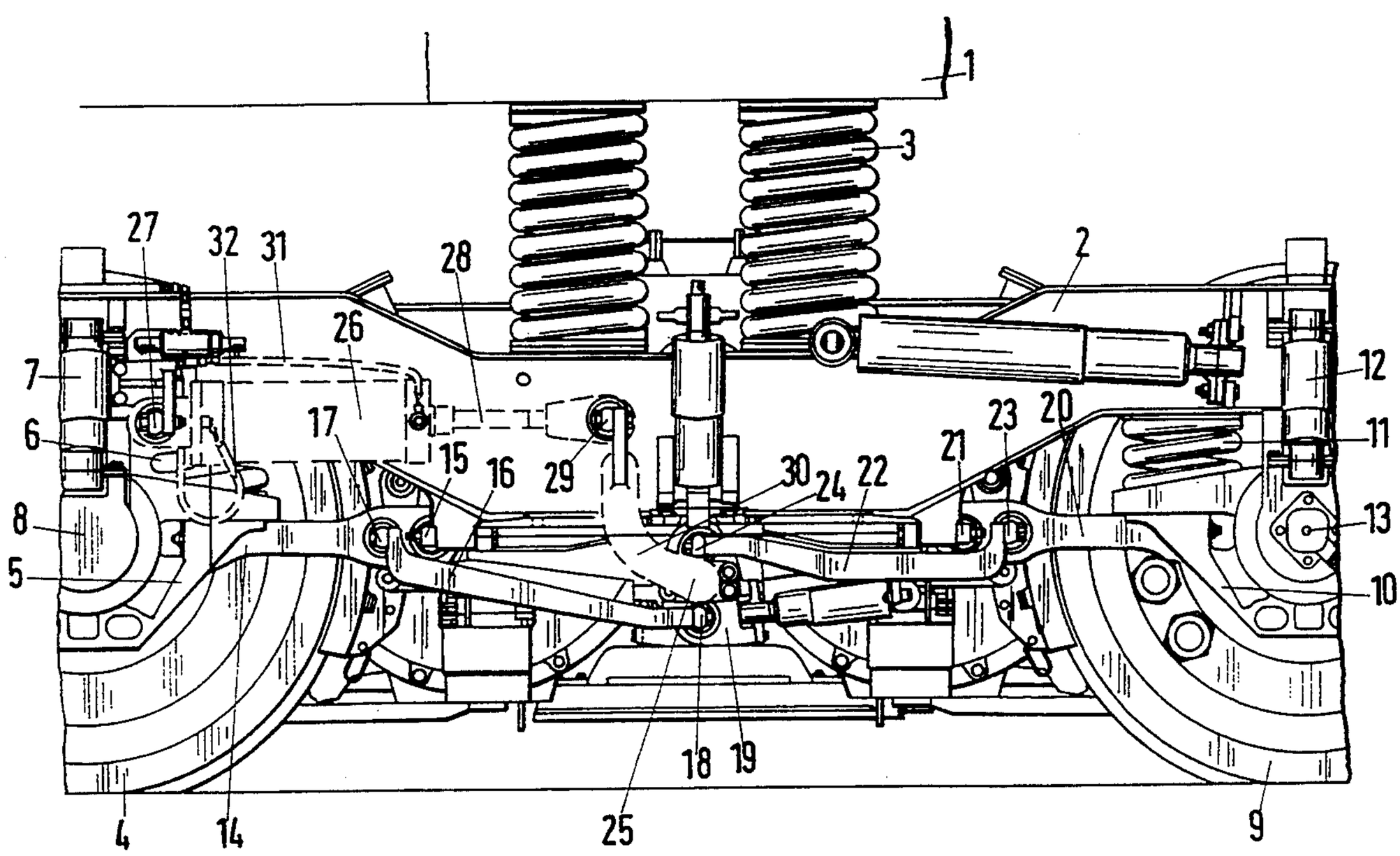
[57] **ABSTRACT**

A railborne vehicle has at least two wheelsets. A running gear includes compensating levers for radially adjusting the wheelsets, and at least one independently controlled control cylinder for influencing a rotary motion of at least one of the compensating levers.

7 Claims, 2 Drawing Sheets



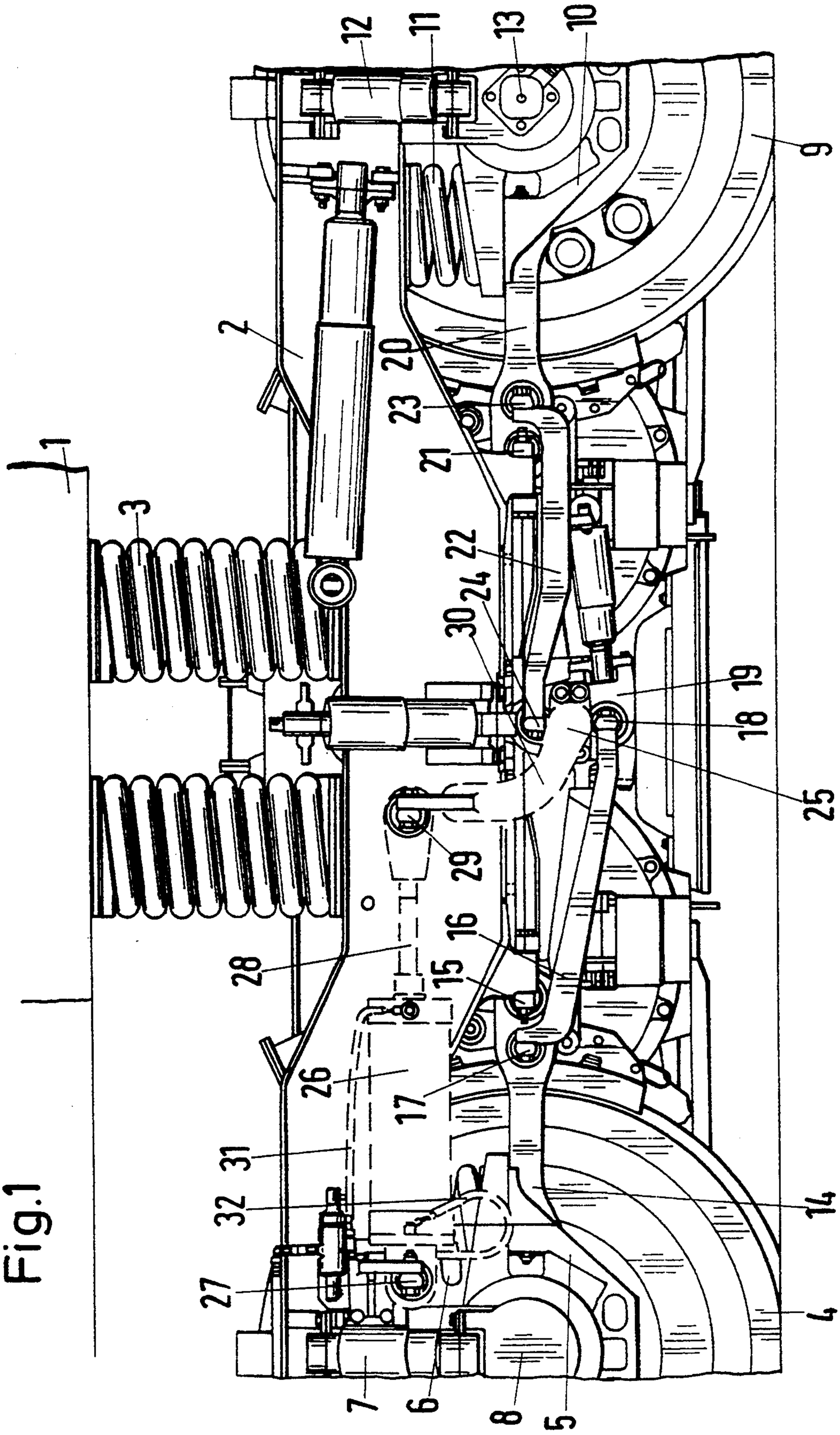

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Fig.1

Fig.2

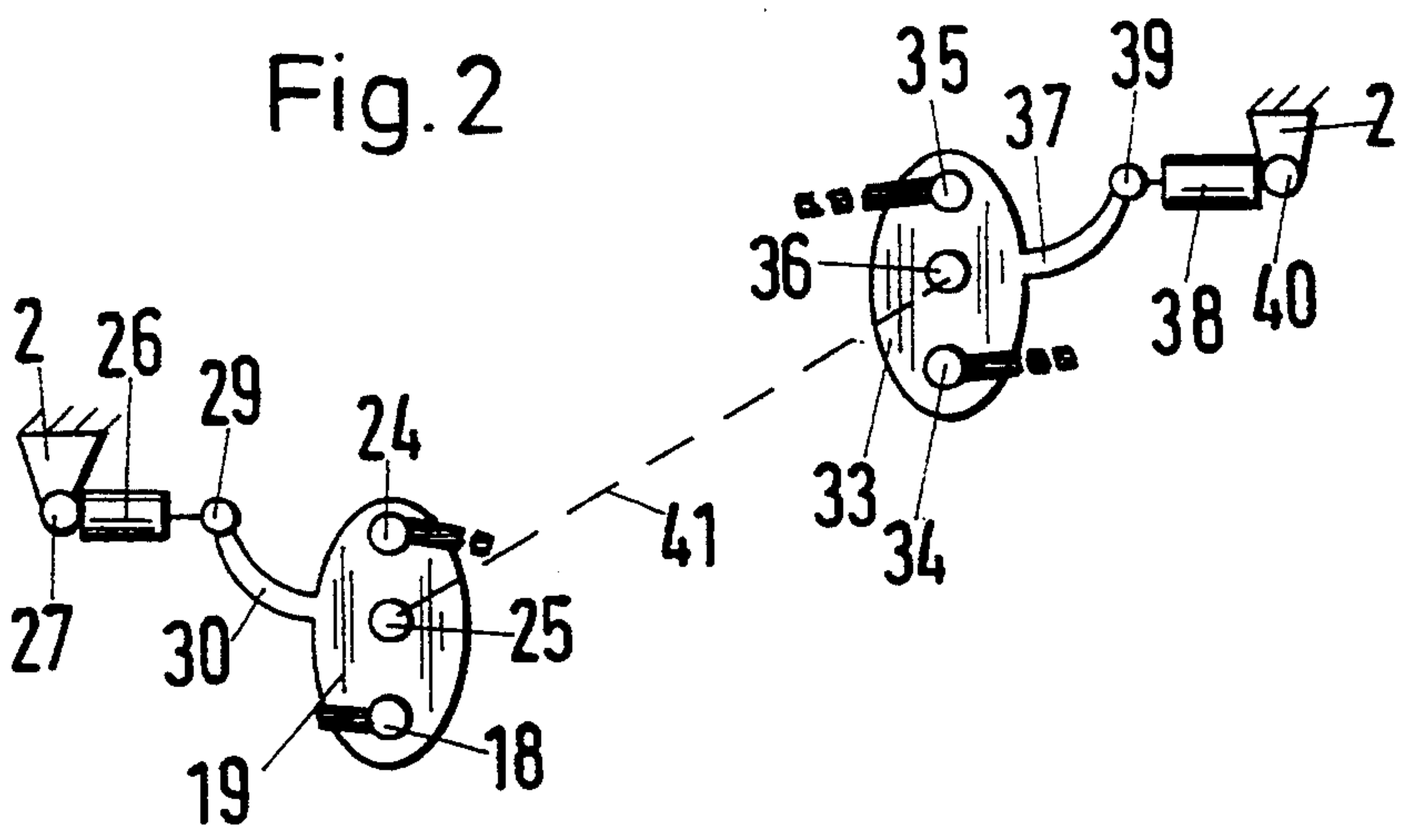


Fig.3

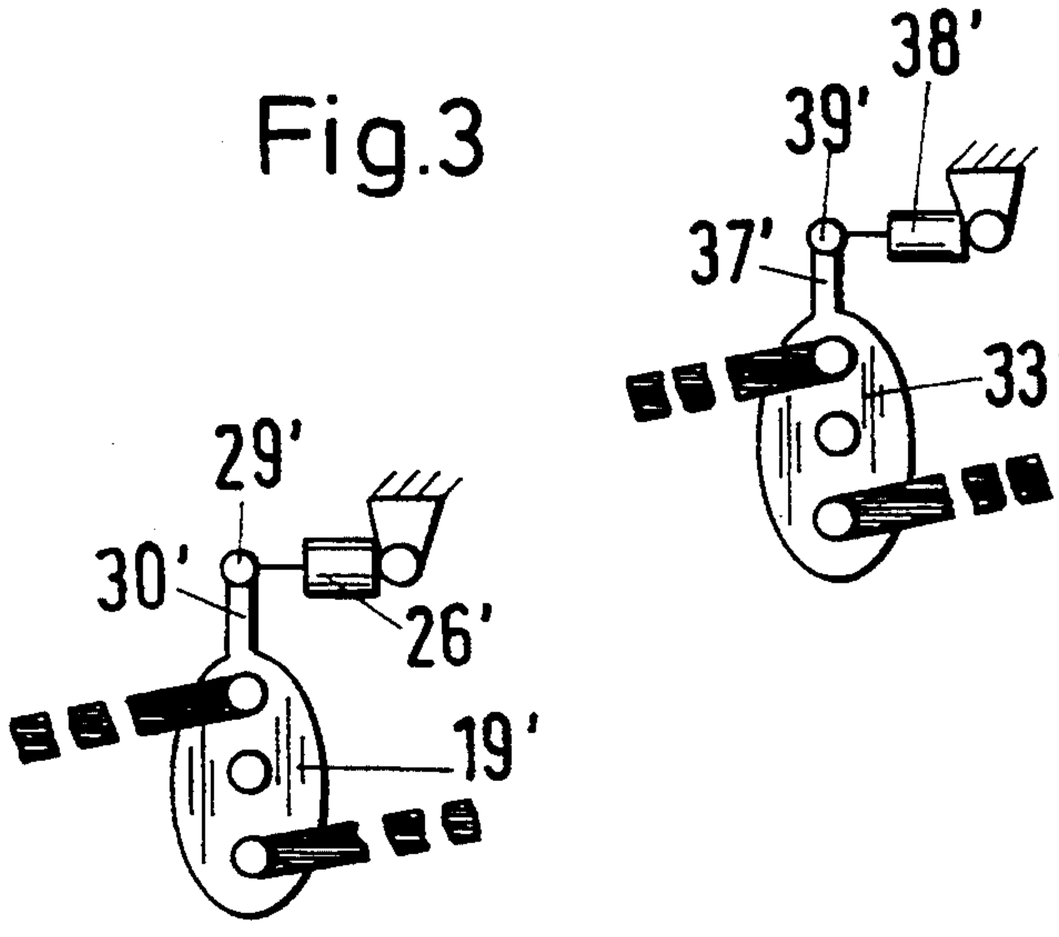
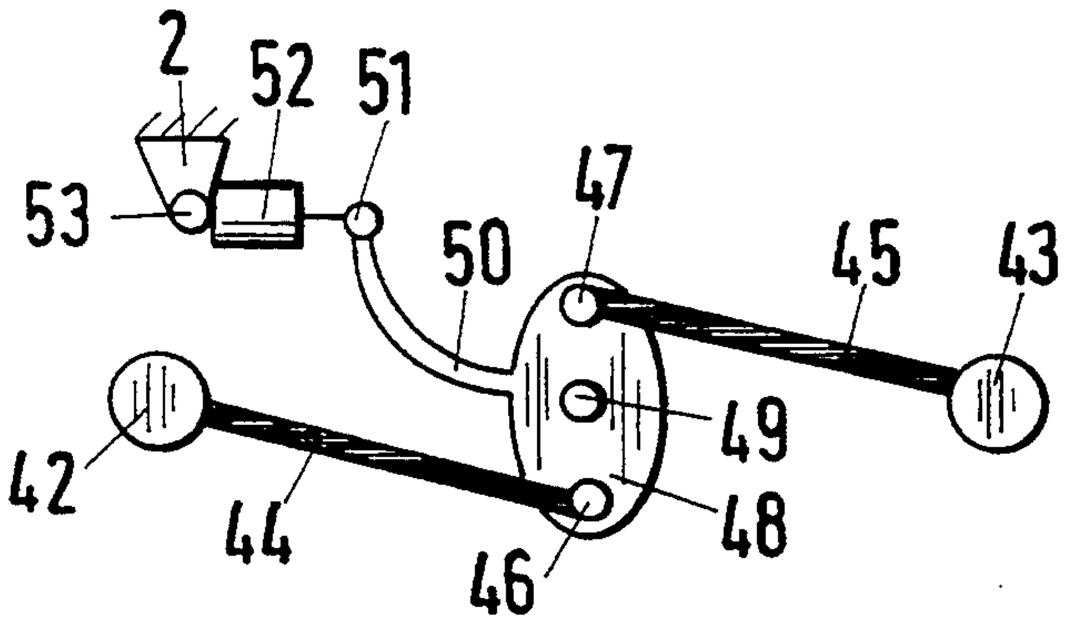


Fig.4



RUNNING GEAR FOR A RAILBORNE VEHICLE WITH RADIAL ADJUSTABILITY

BACKGROUND OF THE INVENTION

1. Field of the Invention

The invention relates to a running gear or undercarriage for a railborne vehicle, which can be used both with locomotives and non-driven railborne vehicles, and which has at least two wheelsets that are radially adjustable through compensating levers.

Such a running gear for a railborne vehicle with radial adjustability is known from German Patent DE 38 27 412 C2. In radial controls, the adjustment of the wheelsets is effected by means of longitudinal forces that arise at contact surface points of the wheels as they travel around curves.

A horizontal restoring force of wheelset springs restricts the radial adjustability of the wheelsets. As a remedy, the horizontal spring characteristic can be reduced by employing softer wheelset springs. However, that provision disadvantageously reduces running stability.

SUMMARY OF THE INVENTION

It is accordingly an object of the invention to provide a running gear for a railborne vehicle with radial adjustability, which overcomes the hereinafore-mentioned disadvantages of the heretofore-known devices of this general type and in which the radial adjustability is not lowered by the horizontal restoring force of the wheelset springs.

With the foregoing and other objects in view there is provided, in accordance with the invention, in a railborne vehicle having at least two wheelsets, a running gear, comprising compensating levers for radially adjusting the wheelsets; and at least one independently or externally controlled control cylinder for influencing a rotary motion of at least one of the compensating levers.

The advantages attainable with the invention reside in particular in the fact that the disruptive influences of the horizontal restoring forces of the wheelset springs during radial control are compensated for by suitable impingement on or adjustment of the control cylinder. As a result, particularly at short curve radii, in which greater horizontal deflections of the wheelset springs are required because of the radial control, the radial controllability is improved. Since the spring characteristic of the wheelset spring that is essential for the radial control is preserved in the crosswise direction (at right angles to the direction of travel), the use of the control cylinder does not have any negative effect on the running stability. On the contrary, the running stability is preserved in its entirely, since recourse need not be made to the employment of softer wheelset springs.

It is known from German Patent DE 30 04 084 C2 to employ a control cylinder to control the swiveling motion of a wheelset of a railborne vehicle in a curve. Unlike that configuration, the use of the control cylinder according to the invention serves not only to control the swiveling motion of the wheelset during travel on curves itself but instead the control force exerted by the control cylinder during travel on curves serves exclusively to overcome the horizontal restoring forces of the wheelset springs. The swiveling motion of the wheelset is brought about solely by the radial control.

In accordance with another feature of the invention, the vehicle has a truck frame, and the at least one control cylinder has a first articulation point connected to the truck frame and a second articulation point connected to at least one of the compensating levers.

In accordance with a further feature of the invention, there is provided a pivot lever through which the second articulation point is connected to at least one of the compensating levers.

In accordance with an added feature of the invention, the vehicle has a truck with right and left sides at which the compensating levers are disposed, and there is provided a pivot shaft through which the compensating levers of the right and left sides of the truck are coupled to one another, the at least one control cylinder being separate control cylinders each being disposed on a respective side of the truck.

In accordance with an additional feature of the invention, the vehicle has a truck with right and left sides at which the compensating levers are disposed, and there is provided a pivot shaft through which the compensating levers of the right and left sides of the truck are coupled to one another, the at least one control cylinder being one control cylinder disposed on only one side of the truck.

In accordance with yet another feature of the invention, the vehicle has a truck with right and left sides at which the compensating levers are disposed, and the at least one control cylinder is two control cylinders acting in opposite directions.

In accordance with a concomitant feature of the invention, the vehicle has a truck with right and left sides at which the compensating levers are disposed, and the at least one control cylinder is two control cylinders being triggered in opposite directions.

Other features which are considered as characteristic for the invention are set forth in the appended claims.

Although the invention is illustrated and described herein as embodied in a running gear for a railborne vehicle with radial adjustability, it is nevertheless not intended to be limited to the details shown, since various modifications and structural changes may be made therein without departing from the spirit of the invention and within the scope and range of equivalents of the claims.

The construction and method of operation of the invention, however, together with additional objects and advantages thereof will be best understood from the following description of specific embodiments when read in connection with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a fragmentary, diagrammatic, side-elevational view of a running gear for a railborne vehicle with radial adjustability having a tandem construction of wheelset guide rods/connecting guide rods;

FIG. **2** is a perspective view of a variant with compensating levers on right and left sides of the bogie or truck that can be coupled selectively with one another through a pivot shaft;

FIG. **3** is a perspective view of a variant without compensating levers being coupled through a pivot shaft; and

FIG. **4** is a side-elevational view of a running gear for a railborne vehicle with radial adjustability.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the figures of the drawing in detail and first, particularly, to FIG. **1** thereof, there is seen a running gear or undercarriage for a railborne vehicle with radial adjustability having a tandem construction of wheelset guide rods/connecting guide rods. A bogie or truck frame **2** is suspended from a car box **1** of a railborne vehicle. Spring elements **3** serve to provide suspension for the car box **1**. Two wheel sets are suspended from the bogie or truck frame **2**. A first wheel **4** of a first wheelset and a first wheel **9** of a second wheelset can be seen. An axle bearing housing **5** with a wheelset bearing of the first wheel **4** of the first wheelset is supported on the bogie or truck frame **2** through wheelset spring elements **6** and wheelset damping elements **7**. A first wheelset axle is indicated by reference numeral **8**.

An axle bearing housing **10** with a wheelset bearing of the first wheel **9** of the second wheelset is supported in the same manner on the bogie or truck frame **2** through wheelset spring elements **11** and wheelset damping elements **12**. A second wheelset axle is identified by reference numeral **13**.

A wheelset guide rod **14** is connected rigidly to the axle bearing housing **5** on one end and pivotably to the bogie or truck frame **2** on the other end through a wrist point **15**. The wrist point **15** is displaceable horizontally but not vertically and represents a pivot point for deflections of the wheelset guide rod **14**. A connecting guide rod **16** serves to couple the wheelset guide rod **14** to a compensating lever **19**. To that end, the guide rod **16** is connected both to the wheelset guide rod **14** through an articulation point **17**, and to the compensating lever **19** through an articulation point **18**.

In the same way, a wheelset guide rod **20** is connected rigidly to the axle bearing housing **10** on one end and pivotably to the bogie or truck frame **2** on the other through a wrist point **21**. The wrist point **21** is displaceable horizontally but not vertically and represents a pivot point for deflections of the wheelset guide rod **20**. A connecting guide rod **22** serves to couple the wheelset guide rod **20** to the compensating lever **19**. To that end, the guide rod **22** is connected both to the wheelset guide rod **20** through an articulation point **23**, and to the compensating lever **19** through an articulation point **24**.

A pivot point **25** of the compensating lever **19** is located centrally between the two articulation points **18**, **24**, and in the position of repose, in other words when the railborne vehicle is traveling straight ahead, these articulation points are oriented vertically.

As can be seen from the geometrical configuration of the connections between the wheelset guide rods **14**, **20**, the connecting guide rods **16**, **22** and the compensating lever **19**, the result when the railborne vehicle travels around curves is radial control that is symmetrical with respect to the two wheelsets. If the two wheels **4**, **9** are running on the rail on the inside of the curve, then the compensating lever **19** executes a counterclockwise rotary motion about the pivot point **25**, and as a result the distance between the two axle bearing housings **5**, **10** decreases in comparison with the position of repose. If the two wheels **4**, **9** are running on the rail on the outside of the curve, then the compensating lever **19** executes a clockwise rotary motion about the pivot point **25**, and as a result the distance between the two axle bearing housings **5**, **10** increases in comparison with the position of repose.

A control cylinder **26** is secured to the bogie or truck frame **2** through an articulation point **27**. A piston rod **28** of the control cylinder **26** is connected through an articulation point **29** to a pivot lever **30** that is rigidly secured to the compensating lever **19**. The control cylinder **26** may be a bidirectional hydraulic cylinder, for example. Pressure can be exerted upon the control cylinder **26** in a suitable way through hydraulic hoses **31**, **32**, so that a compressive or tensile force acting in the direction of rotation about the pivot point **25** can be exerted upon the compensating lever **19** through the piston rod **28** and the pivot lever **30**.

FIG. **2** shows a variant with compensating levers on the right and left sides of the bogie or truck that can be coupled selectively with one another through a pivot shaft. In this perspective view, both compensating levers **19**, **33** of both sides of the bogie or truck can be seen. Through the use of the pivot lever **30** and the articulation point **29**, the compensating lever **19** can be influenced in its rotary motion about the pivot point **25** by the control cylinder **26**. Another end of the control cylinder **26** is mounted on the bogie or truck frame **2** through the articulation point **27**. In the same way, the compensating lever **33** on the other side of the bogie or truck can be influenced in its rotary motion about a pivot point **36** through the use of a pivot lever **37** and an articulation point **39**, by a control cylinder **38**. The control cylinder **38** has another end being secured to the bogie or truck frame **2** through an articulation point **40**.

The drawing indicates that the articulation points **18**, **24** of the compensating lever **19** and articulation points **34**, **35** of the compensating lever **33** are connected to guide rods (wheelset guide rods or connecting guide rods).

The two compensating levers **19**, **33** may, but need not, be coupled together through a rigid pivot shaft **41**.

In either case, with or without coupling of the two compensating levers through a pivot shaft, a contrary motion of the piston rods of the control cylinders **26**, **38** results. In other words, the piston rod of the control cylinder **26** enters farther into the cylinder when the piston rod of the control cylinder **38** emerges from the cylinder, and vice versa. As a result, the influence of the wheelset springs of the two sides of the bogie or truck that is disruptive in the radial control is advantageously compensated for.

If the compensating levers are joined to one another through a pivot shaft, then in a deviation from FIG. **2** it is also possible to provide only one control cylinder, which then influences both sides of the bogie or truck through the pivot shaft.

If two control cylinders are provided in a variant with a pivot shaft, then both control cylinders must act in the same direction of moment. This is done either by structurally configuring the control cylinders accordingly or by actuating them in opposite directions.

FIG. **3** shows a variant without compensating levers being coupled through a pivot shaft. In this version without a pivot shaft, the connecting guide rods may also be selectively disposed in the same direction on the right and left sides of the bogie or truck. Control cylinders **26'** and **38'** are accordingly actuated in contrary directions. In the variant of FIG. **3**, it is additionally seen that pivot levers **30'**, **37'** need not be bent in the form of a crank but may instead be constructed to be straight. What is essential is a developing lever arm

between pivot points of compensating levers **19'**, **33'** and articulation points **29'**, **39'** that are engaged by the control cylinders.

FIG. **4** shows a running gear for a railborne vehicle with radial adjustability. This running gear does not have the tandem guide rod construction of FIG. **1**. Instead, wheelset bearing/axle bearing housings **42** and **43** are secured directly through respective wheelset guide rods **44** and **45** to articulation points **46** and **47** of a compensating lever **48**. A control cylinder **52** is mounted through an articulation point **53** to the bogie or truck frame **2** and through an articulation point **51** to the pivot lever **50** of the compensating lever **48**, so that influence on the rotation of the compensating lever **48** about its pivot point **49** by the control cylinder is possible.

We claim:

1. In a railborne vehicle having at least two wheelsets and wheelset springs, a running gear, comprising:

wheelset guide rods and compensating levers connecting the wheelsets, said wheelset guide rods and compensating levers radially adjusting the wheelsets through longitudinal forces acting when the running gear travels a curve; and

at least one independently controlled control cylinder for influencing a rotary motion of at least one of said compensating levers, a radial control of said compensating levers controlling a steering movement of the respective wheelset during travel through the curve, and a control force of said control cylinder, during the travel through the curve, exclusively acting against a horizontal restoring force of the wheelset springs.

2. The running gear according to claim **1**, wherein the vehicle has a truck frame, and said at least one control cylinder has a first articulation point connected to the truck frame and a second articulation point connected to at least one of said compensating levers.

3. The running gear according to claim **2**, including a pivot lever through which said second articulation point is connected to at least one of said compensating levers.

4. The running gear according to claim **1**, wherein the vehicle has a truck with right and left sides at which said compensating levers are disposed, and including a pivot shaft through which said compensating levers of the right and left sides of the truck are coupled to one another, said at least one control cylinder being separate control cylinders each being disposed on a respective side of the truck.

5. The running gear according to claim **1**, wherein the vehicle has a truck with right and left sides at which said compensating levers are disposed, and including a pivot shaft through which said compensating levers of the right and left sides of the truck are coupled to one another, said at least one control cylinder being one control cylinder disposed on only one side of the truck.

6. The running gear according to claim **1**, wherein the vehicle has a truck with right and left sides at which said compensating levers are disposed, and said at least one control cylinder is two control cylinders acting in opposite directions.

7. The running gear according to claim **1**, wherein the vehicle has a truck with right and left sides at which said compensating levers are disposed, and said at least one control cylinder is two control cylinders being triggered in opposite directions.

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